

Fintech in Ecuador in the process of financial digitalization

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Abstract

The study examines the current situation of Fintech in Ecuador and the challenges they face amid the rapid financial digitalization. It begins by highlighting the transformative impact of Fintech in the global financial sphere and its local growth. The research question is raised about the situation and specific challenges of Fintech in the country. The general objective is to analyze their situation, development, economic impact and financial inclusion, as well as the challenges they face. The methodology used is descriptive, using documentary analysis to collect relevant information. The methodological process and the search terms used are detailed. The findings are organized into thematic categories such as the transformation of the financial sector, financial inclusion, growth and challenges of Fintech, technological infrastructure, cybersecurity and financial regulation. The discussion highlights the role of Fintech in technological and financial transformation, financial inclusion and payment digitalization, as well as the challenges and opportunities they face. In conclusion, the need for collaboration between the public and private sectors is highlighted to address the challenges and promote the sustainable growth of the Fintech sector in Ecuador, for the economic and social development of the country.

Palabras clave: Fintech in Ecuador, Financial inclusion, Technological infrastructure, financial regulation, cybersecurity.

Fintech en Ecuador en proceso de digitalización financiera

Resumen

El estudio examina la situación actual de las Fintech en Ecuador y los retos a los que se enfrentan en medio de la rápida digitalización financiera. Se comienza destacando el impacto transformador de las Fintech en el ámbito financiero global y su crecimiento local. Se plantea la pregunta de investigación sobre la situación y retos específicos de las Fintech en el país. El objetivo general es analizar su situación, desarrollo, impacto económico e inclusión financiera, así como los retos a los que se enfrentan. La metodología utilizada es descriptiva, utilizando el análisis documental para recopilar información relevante. Se detalla el proceso metodológico y los términos de búsqueda utilizados. Las conclusiones se organizan en categorías temáticas como la transformación del sector financiero, la inclusión financiera, el crecimiento y los retos de las Fintech, la infraestructura tecnológica, la ciberseguridad y la regulación financiera. El debate destaca el papel de las Fintech en la transformación tecnológica y financiera, la inclusión financiera y la digitalización de los pagos, así como los retos y oportunidades a los que se enfrentan. En conclusión, se destaca la necesidad de colaboración entre el sector público y privado para abordar los retos y promover el crecimiento sostenible del sector Fintech en Ecuador, para el desarrollo económico y social del país.

Keywords: Fintech en Ecuador, Inclusión financiera, Infraestructura tecnológica, regulación financiera, ciberseguridad.

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I. INTRODUCTION

Fintechs, or financial technology companies, offer digital financial innovations in various sectors such as investment, payments, administration, financing and insurance (Carrillo, 2023). These companies have gained significant space in finance globally, with around a third of digitally active people in the world's largest economies using Fintech services, particularly prominent in China, India, the United States and the United Kingdom (E. Saliger., et al, 2020).

Fintechs have been instrumental in addressing unmet banking needs, improving customer service and providing transparent, efficient and cost-effective financial solutions (TeckLee, 2023). The evolution of Fintech has been internationally recognized by organizations such as the IMF, the World Bank Group and the OECD, highlighting its broad impact on financial services through innovative technologies and business models (Grennan & Michaely, 2020).

Fintech companies have a greater presence in first world nations, on the contrary, their development in most Latin American countries has not been as accelerated, with the exception of: Brazil with 869, Mexico 844 and Colombia 642 (Stefanos Ioannou, Dariusz Wojcik, 2022). Regarding Ecuador, the portal of technological ecosystems that measure entrepreneurship in the country (BUENTRIPHUB, 2023) positions Ecuador in 9th place, with 69 companies in the sector, which gives it emerging status. Despite the small number of Fintech companies in the country, they have presented an approximate growth rate of 7%, going from 39 in 2017 to 69 at the end of 2023.

Despite the increase in the number of Fintech startups and the significant changes in the financial landscape due to the adoption of digital technologies (Solis-Sotomayor., et al, 2022), challenges persist that hinder their full development. According to (Mero., et al, 2022) these challenges, they cover a series of aspects, such as lack of investment, financial exclusion, limited technological infrastructure, the increase in cybercrimes, the complexity of financial regulation, among others. In addition to risks related to data protection and security, which are crucial areas for the sustainability and growth of the industry (Shrier & Pentaland, 2022).

Therefore, as a contribution to research, the present study aims to analyze the current situation

of Fintech in Ecuador, examining its development, impact on the economy and financial inclusion, as well as the challenges they face. It will seek to understand how these companies have evolved in the context of the accelerated digitalization of financial services and evaluate the factors that contribute to their growth in the country.

CONCEPTUAL FRAMEWORK

This article begins an exhaustive analysis of the Fintech landscape in Ecuador, focusing on its evolution, economic repercussions and challenges in a context of growing financial digitalization. To do this, relevant definitions in the field of Fintech will be previously analyzed, laying the foundations for a deeper understanding of this emerging phenomenon.

Fintech in Latin America and Ecuador

The implementation of Fintech technologies in Latin America has shown mixed results in terms of financial inclusion rates. While some progress has been made, barriers to entry in the financial sector and regulatory limitations have hampered the faster adoption of Fintech in the region. Latin America has made substantial progress in financial inclusion through innovations and the use of agent networks by banks, but significant gaps still exist within the region and compared to other economies (Suarez, 2023). Despite the challenges, there is evidence that Fintech start-ups have played a role in increasing financial inclusion by reducing friction and supporting overall business activity, especially at the base of the pyramid, while creating new business leaders (Gershenson., et al, 2021). To further enhance financial inclusion, it is crucial that Latin America continues to take advantage of technological innovations and prioritize financial education

The global data and analysis company for Fintech in the private market (findexable, 2021) published the ranking of the Fintech sector worldwide, with information from 83 countries and 11 thousand Fintech companies. The five most representative countries in the Fintech industry are the United States, the United Kingdom, Israel, Singapore and Switzerland. In Latin America and the Caribbean, there are Brazil, Uruguay, Mexico and Colombia. Ecuador is ranked 9th in Latin America and the Caribbean and 69th in the general ranking. Table

1 details the ranking in Latin America and the Caribbean, table 2 specifies data on Fintech in emerging markets such as Ecuador.

Table 1. Fintech in Latin America and the Caribbean

Country	LAC Rankin	World ranking
Brazil	1	14
Uruguay	2	17
Mexico	3	32
Colombia	4	Four. Five
Chili	5	47
Argentina	6	49
Peru	7	62
Belize	8	67
Ecuador	9	69
Venezuela	10	82

Table 2. Emerging Fintech markets in Latin America

2021			
Country	Fintech Startups	Percentage	Growth (2017-2021)
Peru	1	4.6%	69%
Ecuador	2	2.5%	47%
Dominican Republic	3	23%	129%
Costa Rica	4	1.4%	72%
Uruguay	5	1.4%	28%
Guatemala	6	1.3%	79%

Financial Inclusion

Financial inclusion is one of the most used terms today, such is its importance in allowing people and companies to access a diversity of easily accessible and low-cost financial products and services that satisfy their transactional needs such as: payments, savings, credit and insurance, thus reducing poverty and promoting prosperity (The World Bank, 2022), as proposed in 2015 by the UN, in the Sustainable Development Goals. Other authors, such as Xialing Song , define financial inclusion as the effort to offer financial products and services that can cover the entire society and meet the needs of people and companies in terms of transactions in an affordable and sustainable way. savings, credit and other aspects (Xiaoling Song, Jiaqi Li., 2024). While, for the World Bank, financial inclusion is the engine of the development of a country's financial system, the

growth of income and the improvement of the quality of life of its residents (Iryna Abramova, Larysa Nedilska, Nataliia Kurovska, 2023). The World Bank Group believes that the main objective of financial inclusion is to ensure that people around the world have access to a transaction account that serves as a basis for receiving financial services (The World Bank, 2018).

Financial Technology (Fintech)

Financial technology (fintech) refers to the intersection of information technology and financial services, leading to innovative solutions in the financial sector (Zhang, 2023). (RÎMNICEANU, 2023) Fintech covers several segments, such as online payments using digital currency, peer- to-peer lending, robo- advice for investment, and blockchain technology. (Gopal., et al, 2023). The evolution of the post-2008 fintech financial crisis has given rise to global virtual banks and financial groups using disruptive technologies, emphasizing the importance of cybersecurity and the integrity of the financial system (Maxim, 2022). Fintechs play a crucial role in improving the accessibility, efficiency and security of financial services through trends such as fraud detection, personalized financial advice, robo-advisor and blockchain integration (Putra, 2023).

Financial technological infrastructure

This concept refers to the set of resources and technologies necessary for the operation of Fintech, which include hardware, software, communication networks and data storage systems (Bernards & Campbell-Verduyn, 2019). Financial technology infrastructure encompasses disruptive technologies such as blockchain, mobile banking, cybersecurity and machine learning applied in the financial sector to improve products and efficiency, merging IT and finance (Wilson, 2017).

Security and data protection

Since Fintechs handle large amounts of sensitive user data, the security and protection of this data are critical aspects. Security encompasses the protection of data from unauthorized access, loss or alteration throughout its lifecycle, involving policies, hardware, software and user devices (Dhiipan,

2022). Data lifecycle-based privacy security protection protects the confidentiality, integrity and availability of personal data, controlling all aspects of the information system and users to prevent unauthorized access or use (H. Zhang, S. Cheng, Q. Cai and X. Jiang, 2022).

Cybersecurity

Cybersecurity is the practice of safeguarding systems, networks, and data from cyber attackers (Haripriya, Aleena & Venkadesh, 2024). It involves protection against unauthorized access, data theft and cyber attacks, ensuring the confidentiality, integrity and availability of information (Rao, 2023). Cybersecurity employs various techniques such as firewalls, encryption, strong passwords, and threat detection systems to deter cyber threats. (Mijwil., et al, 2023). The term encompasses defensive actions that use information technology to protect digital environments. With the rapid growth of cyber threats, cybersecurity has become crucial for individuals, businesses, and organizations. The field faces challenges such as a shortage of qualified professionals and the need for greater awareness of cybersecurity risks (Rajabion, 2023). Overall, cybersecurity is essential in today's digital age to prevent data breaches and protect sensitive information.

Digital access

Access to high-speed Internet and the availability of digital services are essential for the functioning of Fintech. Financial regulation plays a crucial role in the development and operation of Fintech. Research indicates that the digital measures implemented by Ecuador's MINEDUC during the pandemic highlighted the digital divide, especially in rural areas where access to technology is limited (Stinson, 2022). In addition, efforts have been made to improve access to information and communication technologies in these areas through projects such as the Implementation of Wireless Networks, benefiting communities dedicated to agriculture and livestock (España, 2023). Studies on youth Internet consumption in Ecuador indicate a growing dependence on mobile devices to access the network, with a focus on services and connectivity rather than activism among the younger generation (Moreira-

Zambrano., et al, 2020). The COVID-19 pandemic has also accelerated the adoption of digital channels for transactions in Ecuador, reflecting a global trend toward greater use of digital media (Rodrigo-Mendizábal., et al, 2020).

Financial Regulation

Financial regulation encompasses the construction and control of financial markets through formal rules and institutional frameworks. It is a crucial mechanism to prevent financial crises, ensure fair transactions, stability and consumer protection (Lopes, 2022). Despite the global trend towards financial liberalization, regulations remain essential and continue to evolve to address new financial instruments and risks (Kumar, 2014). Regulators employ various strategies such as standard-setting, oversight, certification and compliance, choosing between public and private regulatory approaches based on the availability of resources.

II. METHODOLOGY

This study is part of a descriptive research and uses documentary analysis as the main method. Descriptive research seeks to document, describe and analyze various aspects of a topic without manipulation by the researcher, focusing on answering questions such as “What is x?” and “How are things related?” (Miksza., et al, 2023). While documentary analysis is a research technique that involves the review, evaluation and synthesis of relevant documents related to the topic of study (Kutsyuruba, 2023). In this case, an exhaustive analysis of government documents, financial reports, regulatory documents, academic studies and news related to Fintech in Ecuador will be carried out.

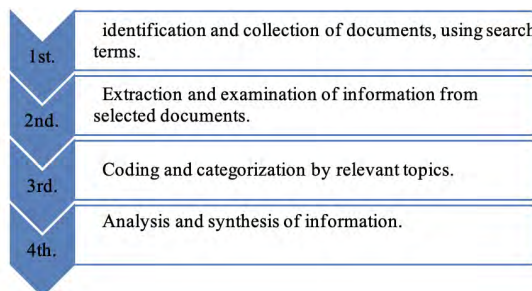


Figure 1. Methodological process of searching for information

Note: It shows the order in which the research is made and the extraction of the information related to the Fintech in Ecuador.

The documentary analysis process will be carried out in several stages. First, relevant documents will be identified and compiled by using specific search

terms related to the topic of study, such as "Fintech in Ecuador", "technological infrastructure", among others (Бессчастная & Горшкова, 2018).

Table 3. Search terms related to the topic of Fintech in Ecuador

"Fintech in Ecuador"
"Financial technology in Ecuador"
"Financial inclusion and Fintech in Ecuador"
"Technological infrastructure and Fintech in Ecuador"
"Cybersecurity in the Ecuadorian financial sector"
"Data security and protection in Ecuador"
"Financial regulation for Fintech in Ecuador"
"Challenges and opportunities for Fintech in Ecuador"

Note. Based on these terms, the document search was carried out.

Next, each document will be critically examined, extracting pertinent information about the Fintech landscape in Ecuador, its opportunities and challenges. Subsequently, a phase of coding and categorization of the information obtained will be

carried out, organizing the data into relevant thematic categories (Stuckey, 2015). This process will identify patterns, trends and significant relationships within the data collected.

Table 4. Relevant categories or themes

No	Relevant categories or themes	Information
1	Transformation of the Ecuadorian financial sector:	The adoption of digital platforms and services has significantly transformed financial technology in Ecuador. The emergence of FINTECH solutions has played a crucial role in streamlining financial services, especially during crises like the COVID-19 pandemic.
2	Financial inclusion and urban-rural disparities:	While digitalization has fostered financial inclusion in urban areas, rural and marginalized areas face significant challenges in accessing and adopting digital financial services.
3	Growth and challenges of FINTECH in Ecuador	The growth of FINTECH startups in Ecuador is notable, but they face significant challenges compared to other nations in the region and globally, such as low investment and restrictive regulations.
4	Telecommunications infrastructure:	Ecuador is experiencing challenges and advances in its telecommunications infrastructure, with notable improvements in urban areas, but problems persist in rural and remote areas.
5	Cybersecurity in the financial sector:	Cybersecurity is a major concern in Ecuador, especially in the financial sector, which has been implementing proactive measures to protect against cyber attacks.
6	Financial regulation and sandboxes:	The implementation of sandboxes and other financial regulations affects the development and operation of FINTECH in Ecuador, generating diverse reactions among entrepreneurs in the sector.

Note. In this table, you will find the most relevant themes extracted from the documents analyzed.

Finally, an interpretive analysis of the results obtained will be carried out (WOOD, 2022), which will consist of the synthesis and drawing of conclusions based on the documentary review carried out (Depraetere., et al, 2018). This critical analysis will allow us to understand the real situation of Fintech in Ecuador, knowing what challenges they

have had to face, such as opportunities for growth and expansion.

III. RESULTS

The previously established criteria and themes allowed the following findings to be made. Financial technology in the country has undergone a significant

transformation driven by the adoption of digital platforms and services in the banking sector (Ordoñez-Granda, et al, 2020). This evolution has been driven by the emergence of FINTECH solutions, which have taken on an essential role in simplifying financial services and transactions, especially during crises such as the COVID-19 pandemic (Palacio, 2021). The country's financial system includes various entities, such as savings and credit cooperatives, savings banks, community banks, and traditional banks, all acting as intermediaries between customers and their financial activities (León-Rodríguez, 2020). As a result of the pandemic, the global trend towards the digitalization of payments accelerated, and Ecuador was no exception. Digitalization increased while traditional payment methods through physical channels lost momentum (asobanca, 2022). Banking transactions in Ecuador experienced annual growth of 37.6% in 2022, with 254 million additional transactions. This increase is supported by the diversity of channels offered by the country's private banks, with digital channels (internet and mobile) being the ones preferred by users, reaching a total of 456 million transactions, 63.3% more than in 2021. Without a doubt, this transformation promoted the growth of financial inclusion in the urban areas of Ecuadorian society (Banco Mundial, 2020), however, the reality is different in rural sectors and marginal areas, where access to bank accounts and adoption of services Digital finance such as mobile banking and electronic payments (Seguros), 2022) are almost non-existent.

Fintech in Ecuador is in a growth process (Mero, 2022), but faces important challenges compared to other nations in the region and globally (a León-Vega, Ron-Amores & Vergara-Romero, 2023). According to a joint report by the Inter-American Development Bank (IDB) and Finnovista, an increase is observed in the number of Fintech startups in the country. Between 2017 and 2021, these companies went from 39 to 61, which represents a growth of 56% in that period (Finnovista, 2021). However, despite this progress, investment in these startups remains relatively low compared to other countries in the region (EY, 2022). In fact, Ecuador only attracted 0.7% of the total investment in Fintech startups in Latin America in 2020, with a total amount of approximately \$1.6 million dollars. This may be due

to several factors, such as: infrastructure, excessive regulations, inefficient security, among others.

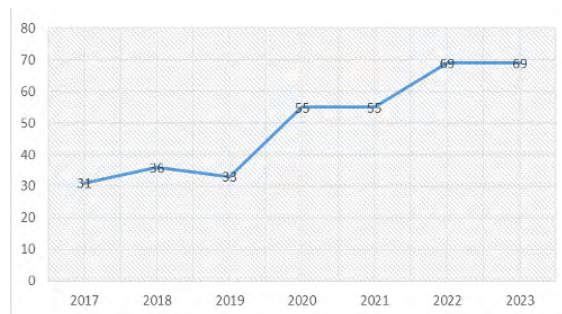


Figure 2. Annual growth of Fintech in Ecuador
Own elaboration, source: Buen Trip Hub, 2017-2023.

Regarding telecommunications infrastructure, Ecuador presents a combination of challenges and significant advances (April, 2023). Although there have been notable improvements in access and coverage, especially in urban areas, rural and remote areas persist with limited or no access to telecommunications services (Movistar, 2023). Service quality varies by location and provider, with issues such as slow internet speeds and frequent outages in some regions (GSMA, 2022). Both the government and private companies have invested considerably in improving infrastructure, including the expansion of fiber optic networks and the modernization of mobile phone antennas (Cámara de Comercio de Quito, 2021). However, the telecommunications market is regulated by the Telecommunications Regulation and Control Agency (ARCOTEL), and although there is competition between providers, a few main players can dominate the market (ARCOTEL, 2023). Ecuador faces future challenges in terms of telecommunications infrastructure, such as the need to expand coverage in rural areas, improve the quality of service and promote the adoption of emerging technologies such as 5G.

In the field of cybersecurity, Ecuador is ranked third in Latin America in terms of the incidence of cybercrime. During 2022 alone, 1,851 complaints related to this crime were registered. The most common crime is fraudulent appropriation by electronic devices. The National Police of Ecuador points out that 'phishing' is one of the most used methods to commit these crimes, tricking people into divulging personal information such as passwords and credit card numbers (asobanca,

2023). They are followed by Ransomware , Malware attack, Exploitation of zero-day vulnerabilities, Target-directed impersonation, Internal threats, among others (EL COMERCIO, 2023). In Ecuador, one of the sectors most committed to protection against cyber attacks is banking. This sector has been devoting significant resources to the adoption of advanced security technologies and the implementation of proactive measures to safeguard their clients' confidential information and protect their systems against possible attacks (Asobanca, the digital era in Ecuador report of transactions made by banks 2019 – 2022, 2023). These measures include the implementation of advanced firewalls, intrusion detection systems, two-factor authentication, and continuous network monitoring. Additionally, banks have implemented cybersecurity training programs for their staff and are promoting awareness among their customers about online security best practices (SUPERBAN, 2005). Which is supported by the Organic Law on Protection of Personal Data, whose purpose is to protect the essential rights of privacy and control over the personal information of individuals.

Fintechs not only face technological challenges, but must also face other challenges. Such as financial regulations, the implementation of sandboxes has been proposed as a regulatory tool to balance innovation and legal protection (EL UNIVERSO, 2023). A "sandbox" in the fintech space is a regulated testing environment that provides new companies in the sector with the opportunity to experiment with innovative financial products and services (Lessambo , 2023). This platform limits participation to a small group of users and is under the supervision of financial authorities. Its primary goal is to promote innovation by allowing startups to develop and test new ideas in a controlled environment, while protecting consumers by minimizing initial risks. Another crucial point regarding the financial regulation of fintechs is the implementation of standardized computer systems for the generation of reports for companies that develop fintech activities in the country (SEPT,2024). These implementations have generated diverse reactions in the country's Fintech entrepreneurs, from acceptance to the opportunity to experiment with new financial products and services in a regulated and controlled

environment, which gives them the possibility of testing and validating their ideas in a safer way before its market launch. Others, however, may perceive these regulations as a limitation to the innovation and agility of their operations, as they may involve a more complex and costly process to comply with regulatory requirements.

IV. DISCUSSION

The research provides a detailed view of the current situation of Fintech in Ecuador, highlighting its role in the transformation of the national financial landscape. The findings reveal a number of crucial aspects that deserve further discussion.

Technological and Financial Transformation:

The results indicate that Fintech are leading a significant transformation in the Ecuadorian financial sector, driven by the adoption of digital platforms and services. This evolution has simplified financial processes and improved the accessibility of services for users, especially during the COVID-19 pandemic.

Financial Inclusion and Digitalization of Payments:

Although there is notable growth in the digitalization of payments and banking transactions, disparities persist in financial inclusion between urban and rural areas. While in cities digitalization has promoted financial inclusion, in rural and marginalized areas there are still significant barriers to accessing digital financial services.

Among the expected trends in the processes of change in digital payments, the following are mentioned:

- Increase in digital wallets that promote A2A payment, in digital markets in the United States and Europe they use intermediaries such as Google Pay , on the contrary, in Latin America the scenario will be the same as other emerging markets such as India and Brazil where the use of digital wallets is preferred A2A.
- Increase in the use of digital identity wallets, considerable growth is expected globally, in Latin American markets the growth will be mixed depending on factors such as the economic policies of each country.

- Using AI to streamline anti-money laundering (AML) compliance processes.
- Implementation of biometric payment protocols in physical stores, taking into consideration technological proposals such as Amazon One, in Latin America the use of payments based on biometric recognition is expected within the next year.

Fintech Growth and Challenges:

Despite the growth observed in the number of Fintech startups in Ecuador, these companies face significant challenges. Lack of investment, excessive regulations and limitations in technological and telecommunications infrastructure are significant obstacles that could hinder its growth and its ability to compete regionally and globally.

Cybersecurity and Data Protection:

The increasing incidence of cybercrime in Ecuador poses significant challenges in terms of cybersecurity and data protection for Fintech and the banking sector. While advanced security measures are being implemented, there is still work to be done to protect sensitive user information and mitigate the risks associated with cyber attacks.

Among the main challenges to comply with cybersecurity in the process of growing online operations are:

- Improve the integration protocols of Artificial Intelligence (AI) in identity verification processes.
- Use of machine learning algorithms for the implementation of biometrics and facial recognition in authentication processes.
- Use of AI to analyze complex patterns, identifying and alerting about possible inconsistencies that could go unnoticed by traditional methods.
- Implement the ability to evaluate patterns and changes in user behavior over time, improving response to new threats.
- Adaptation of emerging technologies for operational optimization, redefinition of user-centered development strategies, and resistance to cyber threats.
- Implementation of predictive models based on AI that allow identifying potential risk patterns, strengthening transaction security.

Regulation and Financial Sandboxes:

Financial regulation plays a crucial role in the development and operation of Fintech in Ecuador. The implementation of regulatory sandboxes is presented as an opportunity to foster innovation while protecting consumer interests. However, its application poses challenges and generates diverse reactions among Fintech entrepreneurs in the country.

V. CONCLUSIONS

In summary, this study highlights the transformative role of Fintech in Ecuador, driving the digitalization of the financial sector and improving the accessibility of financial services, especially during the COVID-19 pandemic. However, significant challenges remain that hinder its full development. These include lack of investment, financial exclusion in rural areas, limited technological infrastructure, cybersecurity risks and the complexity of financial regulation. To address these challenges, greater collaboration between the public and private sectors is required, as well as the implementation of policies and programs that promote financial inclusion, strengthen technological infrastructure and improve cybersecurity. Additionally, implementing regulatory sandboxes could foster innovation while protecting consumer interests. Together, these measures can boost the sustainable growth of the Fintech sector in Ecuador, thus contributing to the economic and social development of the country.

INTEREST CONFLICT

We declare that we have no conflict of interest in relation to this article. We have not received funding from any organization that may have an interest in the results presented here, nor do we have personal or financial relationships that could influence our work. We confirm that this study has been carried out impartially and that the results are presented in a transparent and objective manner.

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